

ART COPY  
1968 JUL 17  
1968

1966 OPERATING SUMMARY

**UNION**

***water system***

ONTARIO WATER RESOURCES COMMISSION

*Division of Plant Operations*

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Members of the Union Local Advisory Committee.

Gentlemen:

We are pleased to submit to you the 1966 Operating Summary for the Union Water Treatment Plant, OWRC Project No. 57-W-12.

It is hoped that our joint participation in efforts to protect your water supply will have even more success in the coming year.

Yours very truly,

A handwritten signature in dark ink, appearing to read "D. S. Caverly", is written over the typed name.

D. S. Caverly,  
General Manager.



ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

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VICE-CHAIRMAN

D. S. CAVERLY  
GENERAL MANAGER

W. S. MACDONNELL  
COMMISSION SECRETARY

General Manager,  
Ontario Water Resources Commission.

Dear Sir:

I am happy to present you with the 1966 Operating Summary for the Union  
Water Treatment Plant, OWRC Project No. 57-W-12.

The report offers a concise summary of operating data for the year and  
comparisons with previous years where these are applicable and signifi-  
cant.

Yours very truly,

A handwritten signature in cursive script, appearing to read "B. C. Palmer".

B. C. Palmer, P. Eng.,  
Director,  
Division of Plant Operations.

## FOREWORD

● This operating summary contains complete information on the management of the project during 1966. It contains a concise review of the year's plant operation, significant financial details, and a visual presentation in graphs and charts of technical performance.

The information will be of value to interested parties in assessing the adequacy of the project at this time and its ability to meet future requirements.

The report is the result of co-operation by several groups within the Division of Plant Operations. These include the statistics section and the technical publications section. The Division of Finance and the draughting section of the Division of Sanitary Engineering were also closely associated with its publication.

The Regional Operations Engineer, however, has had the primary responsibility for the content, and will be happy to answer any questions regarding it.

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**U N I O N**  
**w a t e r   s y s t e m**

operated for the

TOWN OF LEAMINGTON  
TOWN OF ESSEX  
TOWNSHIP OF GOSFIELD NORTH  
TOWNSHIP OF GOSFIELD SOUTH  
TOWNSHIP OF MAIDSTONE  
TOWNSHIP OF MERSEA  
H. J. HEINZ COMPANY OF CANADA LIMITED

by the

ONTARIO WATER RESOURCES COMMISSION

---

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Assistant Director:	C. W. Perry
Regional Supervisor:	A. C. Beattie
Operations Engineer:	P. J. Osmond

801 Bay Street            Toronto 5

# **'66 REVIEW**

The total system operating cost of \$125,462.04 was higher than in 1965 by \$327.81 or 0.26%. The production cost of water over the past six years has been 7.3, 7.7, 8.2, 9.2, 8.1 and 8.4 cents per 1000 gallons, the increased unit cost in 1966 being due mainly to decreased consumption.

## **OUTPUT AND CONSUMPTION**

The total output of the Union Water System in 1966 decreased by 3.4% from the 1965 water production. Consumption by participant was generally down except for the Township of Gosfield North, which experienced an increase of 9.6%. The maximum demand on the plant occurred during late June and early July and was critical for periods of two to ten days.

## **TURBIDITY**

Raw water turbidities again held steady, and better than 99% removal was experienced. Chlorine demands were again up slightly indicating continuing deterioration of the raw water.



## PROJECT COSTS

NET CAPITAL COST (Estimated)                      \$3,841,802

Note: The participants' share of net capital cost varies each year on the basis of consumption.

### DEBT RETIREMENT BALANCE AT CREDIT (Sinking Fund) December 31, 1966

Essex	\$ 42,360.73
Leamington	70,343.85
H. J. Heinz	92,574.22
Gosfield North	5,962.03
Gosfield South	11,471.90
Mersea	21,777.56
Maidstone	<u>6,396.71</u>
TOTAL	<u>\$250,887.00</u>

The total cost to the municipality during 1966 was as follows:

NET OPERATING

Essex	\$ 15,851.36	
Leamington	34,796.02	
H. J. Heinz	49,708.93	
Gosfield North	2,906.58	
Gosfield South	7,315.67	
Mersea	13,296.93	
Maidstone	1,586.75	
		<hr/>
		\$125,462.04

DEBT RETIREMENT

Essex	\$ 12,436.86	
Leamington	19,863.49	
H. J. Heinz	28,379.08	
Gosfield North	2,274.95	
Gosfield South	4,137.66	
Mersea	8,183.63	
Maidstone	2,251.33	
		<hr/>
		\$ 77,527.00

RESERVE

Essex	\$ 4,027.01	
Leamington	6,937.18	
H. J. Heinz	9,910.83	
Gosfield North	733.54	
Gosfield South	1,451.92	
Mersea	2,782.32	
Maidstone	625.20	
		<hr/>
		\$ 26,468.00

INTEREST CHARGED

Essex	\$ 34,565.72	
Leamington	55,382.76	
H. J. Heinz	79,125.65	
Gosfield North	6,320.47	
Gosfield South	11,665.68	
Mersea	22,817.34	
Maidstone	6,270.93	
		<hr/>
		<u>\$216,148.55</u>

TOTAL COST \$445,605.59

Summary of Participants' Share  
in 1966 Charges

Essex	\$ 66,880.95
Leamington	116,979.45
H. J. Heinz	167,124.29
Gosfield North	12,235.54
Gosfield South	24,570.93
Mersea	47,080.22
Maidstone	10,734.21
	<u>\$445,605.59</u>

OPERATING COSTS

Union Common	\$123,341.12
Union East	770.76
Union West	<u>1,350.16</u>
Total System Cost	<u>\$125,462.04</u>

### MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	6307.91	4062.42		2125.81		36.43			83.25
FEB	8032.58	3946.42	506.64	2130.41	795.71	185.23		239.16	229.01
MARCH	5547.33	4056.12	298.02	1914.15	572.40	251.11	86.67	(2071.58)	440.44
APRIL	10890.69	6190.23	429.01	1821.04	15.75	531.85		1597.24	305.57
MAY	7617.92	4139.73	354.72	1621.54	780.00	443.47			278.46
JUNE	10377.42	4445.57	282.61	1886.91	1188.60	331.01	923.89	591.01	727.82
JULY	11222.26	4048.58	126.43	2597.10	2026.32	418.08	843.70	675.72	486.33
AUG	21704.55	5846.28	11.98	2360.19	648.05	51.74	64.76	488.77	12232.78
SEPT	13203.16	6443.02	12.27	2261.28	2230.65	263.68	2.89	1955.23	34.14
OCT	8276.78	4447.62	12.57	2211.99	1196.54	139.08		228.67	40.31
NOV	8598.88	4222.03	97.18	1919.86	774.47	350.83		748.56	485.95
DEC	11561.64	4599.87	620.52	1760.06	1225.37	277.00	(4.62)	2619.52	463.92
* TOTAL	123341.12	56447.89	2751.95	24610.34	11453.86	3279.51	1917.29	7072.30	15807.98
UNION EAST	770.76							394.91	375.85
UNION WEST	1350.16			881.95					468.21

BRACKETS INDICATE CREDIT

\* UNION COMMON

TOTAL SYSTEM OPERATING COST : \$125,462.04

## TOTAL AREA FLOW

Month	Total Flow MGD	Max. MGD	Avg. Min. MGD	Avg. Daily MGD	Cumulative Total
January	89.676	4.188	1.490	2.893	89.676
February	88.600	4.396	1.640	3.164	178.276
March	94.525	3.976	1.862	3.049	272.801
April	94.600	4.574	1.889	3.154	367.401
May	124.600	6.091	1.880	4.019	492.001
June	171.662	8.040	2.814	5.722	663.663
July	180.698	8.298	3.630	5.829	844.361
August	157.329	6.710	2.860	5.075	1001.690
September	147.050	7.360	1.900	4.902	1148.740
October	109.755	5.199	1.467	3.540	1258.495
November	104.333	5.748	1.572	3.478	1362.828
December	90.252	4.303	1.560	2.911	1453.080
Total	1453.080	-	-	-	-
Average	121.090	5.740	2.047	3.981	-

### COMMENTS

During 1966, a total of 1453.080 million gallons of water were treated and pumped from the plant as measured by meter No. 1. It should be noted that this reading is slightly less than the cumulative readings of the area meters. The difference is 2.3% and is attributed mainly to meter discrepancies and line losses.

The total plant output for 1966 is down approximately 5.6% from 1965. The average daily flow of 3.981 million gallons represents 52.5% of plant design capacity (7.6 MGD). The average maximum daily flow of 5.74 million gallons represents 75.5% of plant design capacity.

### CONSUMPTION OF PARTICIPANTS

PARTICIPANT	CONSUMPTION (MG)									% OF TOTAL								
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1960	1961	1962	1963	1964	1965	1966	1967	1968
GOSFIELD S.	16.34	37.29	51.74	74.96	75.01	99.12	87.37			1.6	2.0	3.9	5.4	5.5	6.4	5.9		
GOSFIELD N.	9.95	13.13	21.60	29.53	23.35	30.06	32.93			0.9	1.1	1.6	2.1	1.7	1.9	2.2		
MERSEA	55.70	79.85	99.51	137.71	127.96	168.68	158.53			5.3	6.5	7.4	9.8	9.4	11.0	10.7		
LEAMINGTON	335.00	399.91	404.41	455.70	407.97	449.64	416.38			31.8	32.5	30.5	32.5	30.0	29.2	28.0		
HEINZ	500.00	534.50	557.04	520.40	541.00	595.00	594.00			47.5	43.5	41.8	37.1	39.8	38.8	40.0		
ESSEX	130.00	158.58	190.04	177.07	174.46	177.72	179.12			12.4	12.9	14.3	12.6	12.8	11.5	12.0		
MAIDSTONE	5.41	6.37	8.45	7.46	9.52	18.03	18.19			0.5	0.5	0.6	0.5	0.8	1.2	1.2		
TOTAL	1052.40	1229.63	1332.42	1402.83	1359.37	1538.25	1486.51			100.0	100.0	100.0	100.0	100.0	100.0	100.0		

### COMMENTS

Consumptions of the Townships of Gosfield S. , Gosfield N. , Mersea and Maidstone have better than trebled since 1960, while the consumption of Essex, Leamington and Heinz has increased at the most by about a third. Each participants share of the total consumption has remained in its same relative position since 1960, with Heinz being the largest user at approximately 40% and Maidstone the smallest at about 1% of the total consumption.

PARTICIPANT	AGREED ANNUAL MINIMUMS		ANNUAL CONSUMPTIONS								AGREED DAILY MAXIMUMS	1966 PEAK MONTHLY RATE CALCULATED DAILY
	ORIGINAL	REVISED	1960	1961	1962	1963	1964	1965	1966			
	MG	MG	MG	MG	MG	MG	MG	MG	MG	1000 GALS.	1000 GALS.	
H.J. HEINZ	520.0	520.0	500.0	534.5	557.0	520.4	541.0	595.0	594.0	3500	1860	
LEAMINGTON	426.0	400.0	335.0	399.9	404.0	455.7	408.0	449.6	416.4	2100	1850	
ESSEX	166.0	160.0	130.0	158.6	190.0	177.1	174.5	177.7	179.1	752	835	
MERSEA	12.5	70.0	55.7	79.8	99.5	137.7	128.0	168.7	158.5	40	785	
GOSFIELD S	16.5	40.0	16.3	37.3	51.8	74.9	75.0	99.1	87.4	60	555	
GOSFIELD N	23.5	20.0	10.0	13.1	21.6	29.5	23.3	30.1	32.9	80	188	
MAIDSTONE	12.0	10.0	5.4	6.4	8.5	7.5	9.6	18.1	18.2	45	71	
TOTAL	1176.5	1220.0	1052.4	1229.6	1332.4	1402.8	1359.4	1538.2	1486.5	6577	5800	

## COMMENTS

The tabulation above shows the evolution of both agreed minimum and maximum flow requirements of each participant since the system was put into operation. It is especially significant to note that in 1966 the Townships of Mersea and Gosfield South, used more than twice their guaranteed minimums and consumed on a daily basis water many times in excess of their agreed daily maximum.

# UNION WATER SYSTEM

## 1966 FLOW DATA

### ADJUSTED MONTHLY FLOWS BY PARTICIPANT

Flows expressed in Million Gallons (MG)

Month	Gosfield South	Mersea	Leamington	Essex	Maidstone	Gosfield North	Heinz	Total
January	3.199	7.958	25.408	11.091	1.328	1.935	47.187	98.106
February	3.187	7.927	25.306	11.047	1.323	1.928	46.253	96.971
March	5.013	11.268	25.746	11.089	1.131	2.309	45.671	102.227
April	5.259	11.823	27.012	11.635	1.186	2.422	43.010	102.347
May	11.131	15.693	32.359	10.689	1.245	2.139	46.120	119.376
June	16.627	23.442	48.337	15.967	1.860	3.195	55.020	164.448
July	13.122	22.900	57.356	25.878	2.210	2.932	55.470	179.868
August	10.311	17.992	45.066	20.333	1.737	2.303	57.735	155.477
September	7.313	13.008	48.558	23.138	2.005	5.638	55.932	155.592
October	4.754	8.457	31.570	15.043	1.303	3.666	52.674	117.467
November	4.017	9.735	26.767	12.509	1.540	2.407	47.310	104.285
December	3.436	8.327	22.894	10.698	1.318	2.058	41.618	90.349
Totals 1966	87.369	158.530	416.379	179.117	18.186	32.932	594.000	1486.513
Totals 1965	99.116	168.684	449.640	177.721	18.031	30.060	595.000	1538.252
% Diff. 66/65	-11.9%	-6.0%	-7.4%	+0.8%	+0.9%	+9.6%	-0.2%	-3.4%

### COMMENTS

The chart of Adjusted Flows is merely a monthly representation of the bimonthly flow determinations as per meter readings taken by participants and the plant staff. The difference between 1966 and 1965 consumption by participant is shown on the last line.



## Process Data

### PLANT FLOW

Graph No. 1 shows the peak monthly flow almost the same as in 1965 and the total annual flow down slightly. Again the peak month occurred in July when 180 million gallons were pumped. This represents an average daily flow of 5.80 MG which is 76.4% of the plant capacity.

### H. J. HEINZ

Graph No. 2 shows that the total annual flow unchanged even though the annual peak was down markedly. The peak occurred in August which is not coincident with the plant peak.

### LEAMINGTON

Graph No. 3 indicates a decrease in both total annual flow, and monthly peak flow. The peak again occurred in July, coincident with the plant peak.

### ESSEX

Graph No. 4 shows that annual flow is again up slightly. The monthly peak however decreased slightly and again occurred in July.

### MERSEA

Graph No. 5 indicates that the monthly peak in 1966 was down slightly from 1965 and occurred again in June. The total annual flow also decreased slightly.

#### GOSFIELD SOUTH

Graph No. 6 shows a slight decrease in both monthly peak and total annual flow. The peak however, again occurred in June and was off the plant peak.

#### GOSFIELD NORTH

Graph No. 7 shows a marked increase in peak monthly flow while total annual flow increased slightly. The peak however occurred in September and was off the plant peak.

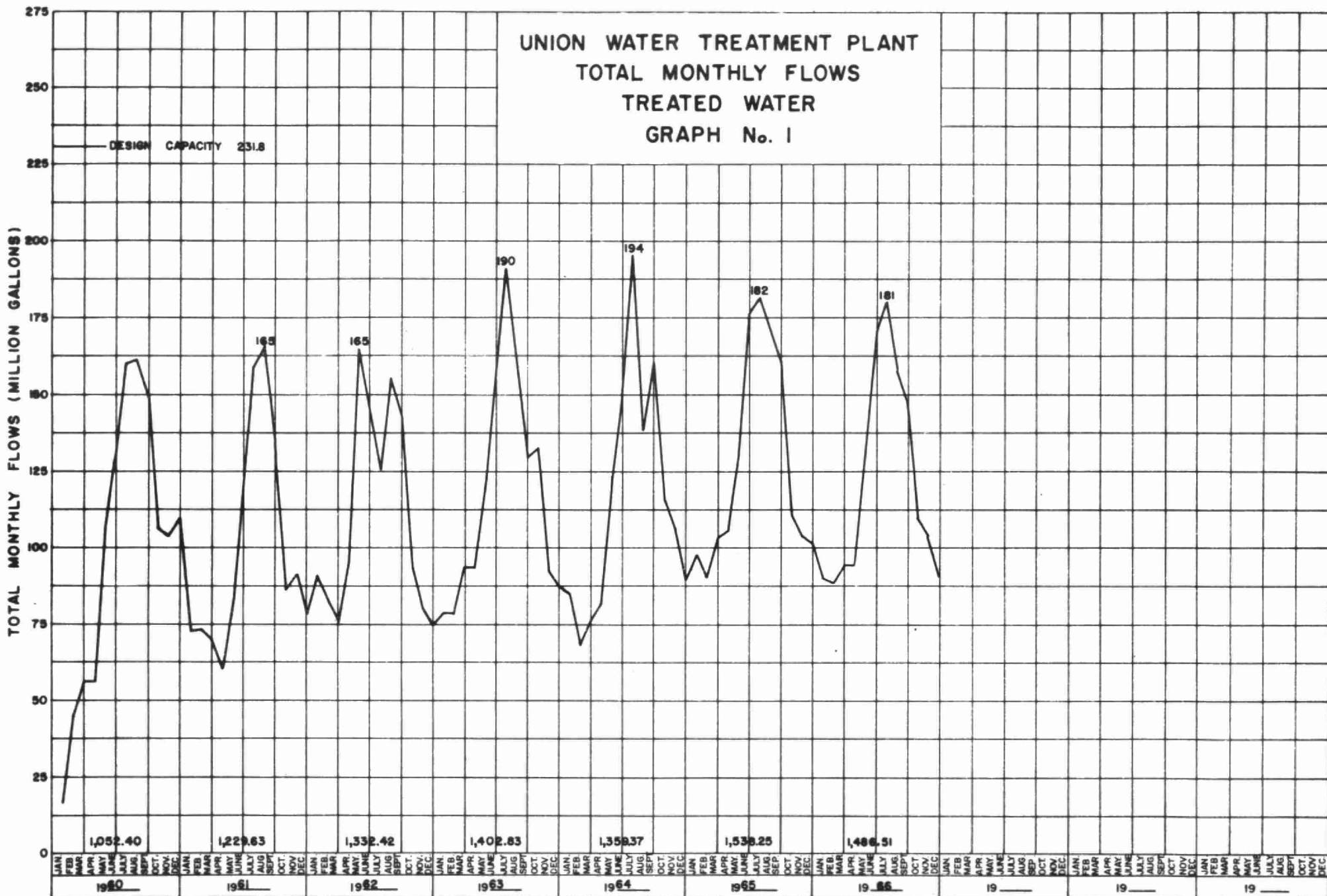
#### MAIDSTONE

Graph No. 8 shows almost no change in both peak monthly flow and total annual flow. The peak occurred in July.

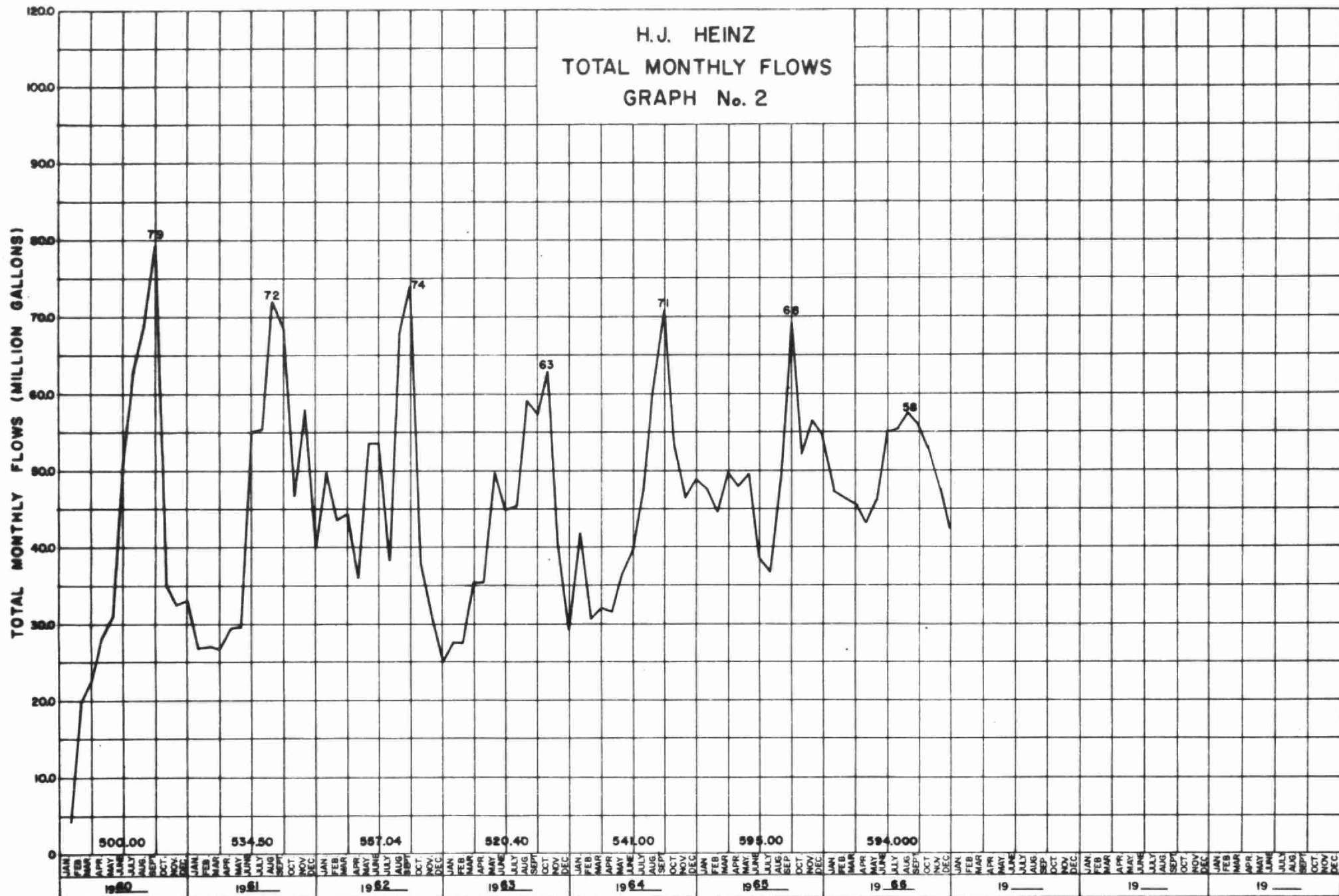
#### SEASONAL TURBIDITY VARIATION

The graph of seasonal turbidity variation shows that the 1966 peak was again extreme. The turbidity in the clarified and filtered water remained at very satisfactory levels with the overall removal efficiency holding at better than 99%.

# UNION WATER TREATMENT PLANT TOTAL MONTHLY FLOWS TREATED WATER GRAPH No. 1

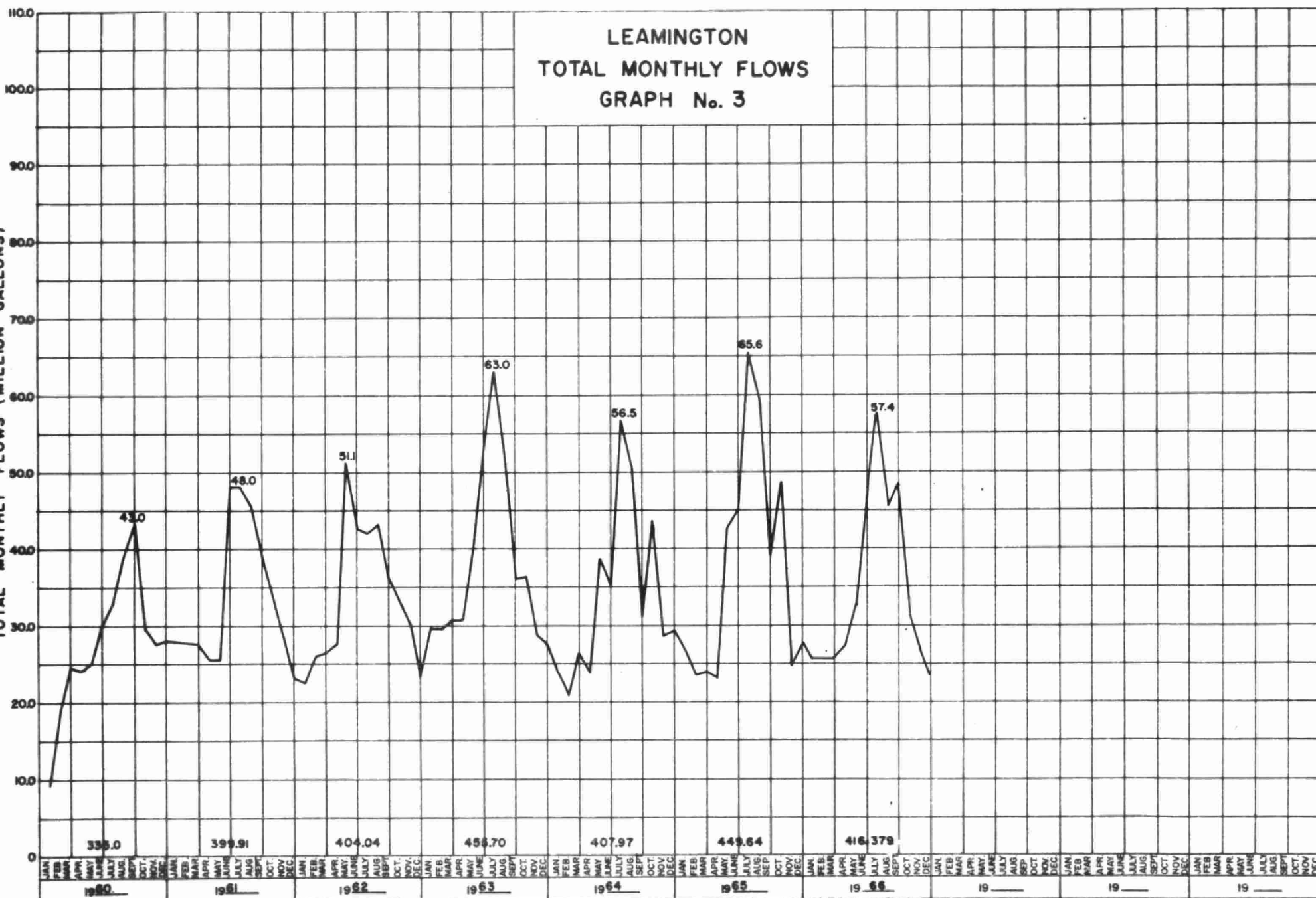


# H.J. HEINZ TOTAL MONTHLY FLOWS GRAPH No. 2



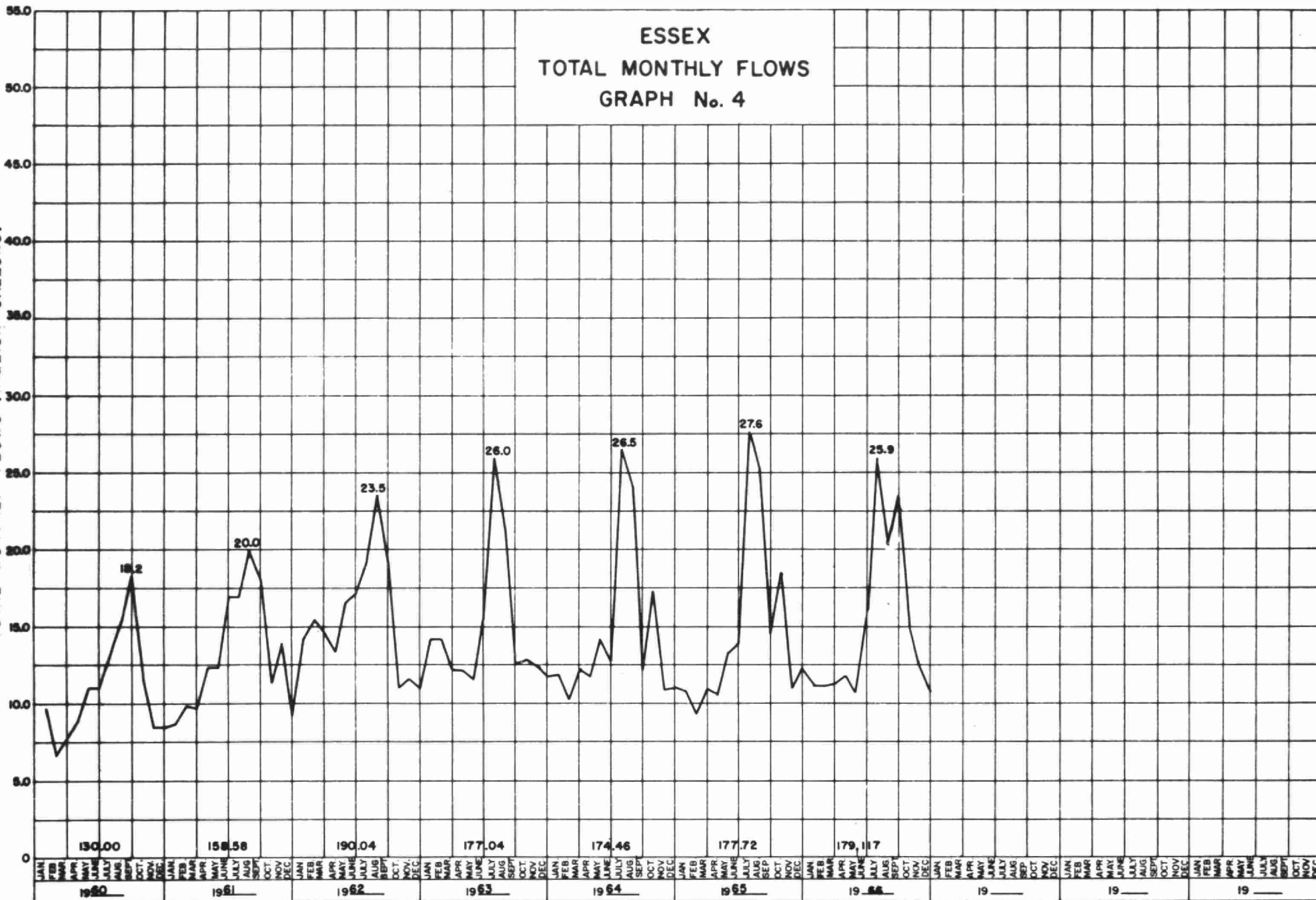
# LEAMINGTON TOTAL MONTHLY FLOWS GRAPH No. 3

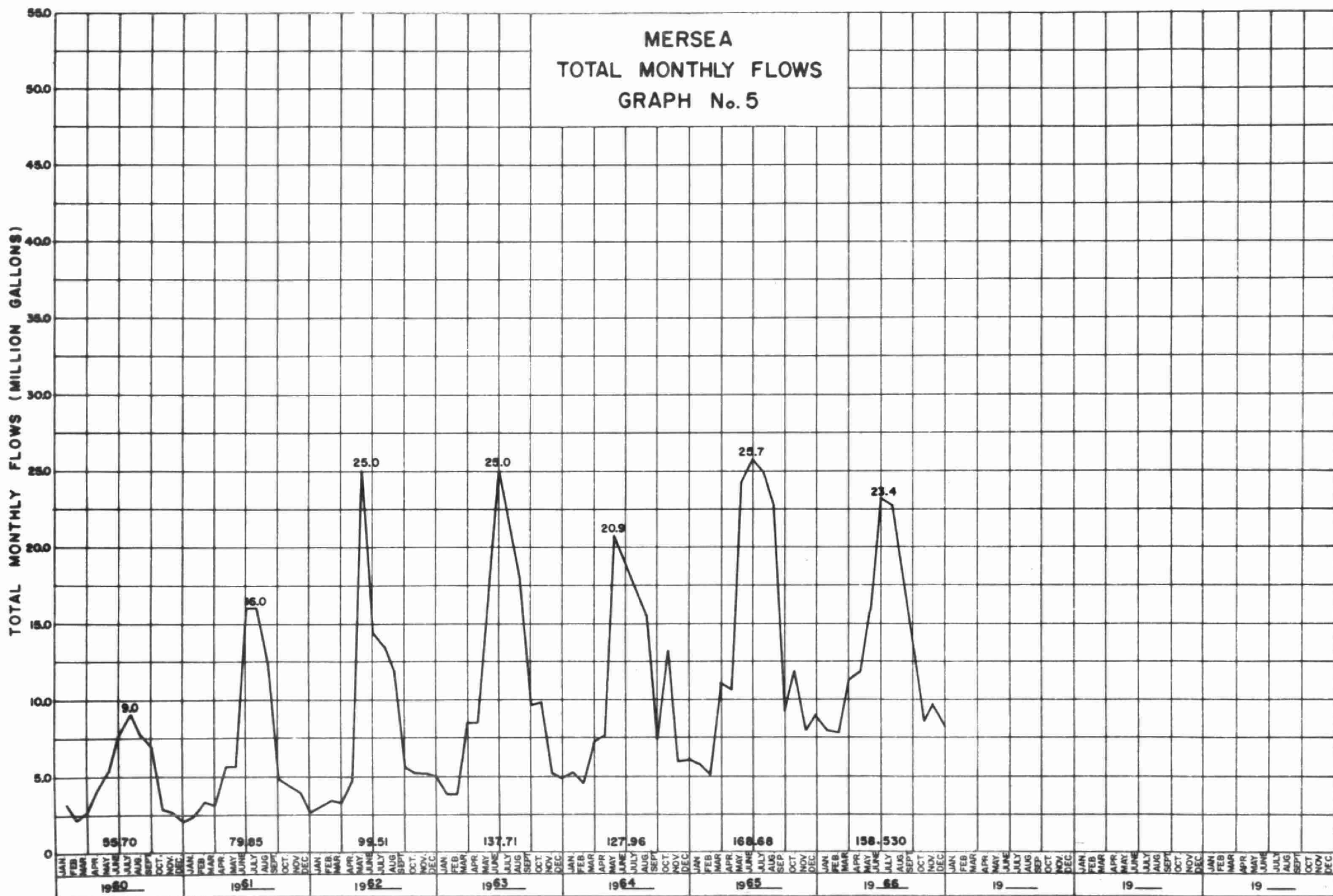
TOTAL MONTHLY FLOWS (MILLION GALLONS)

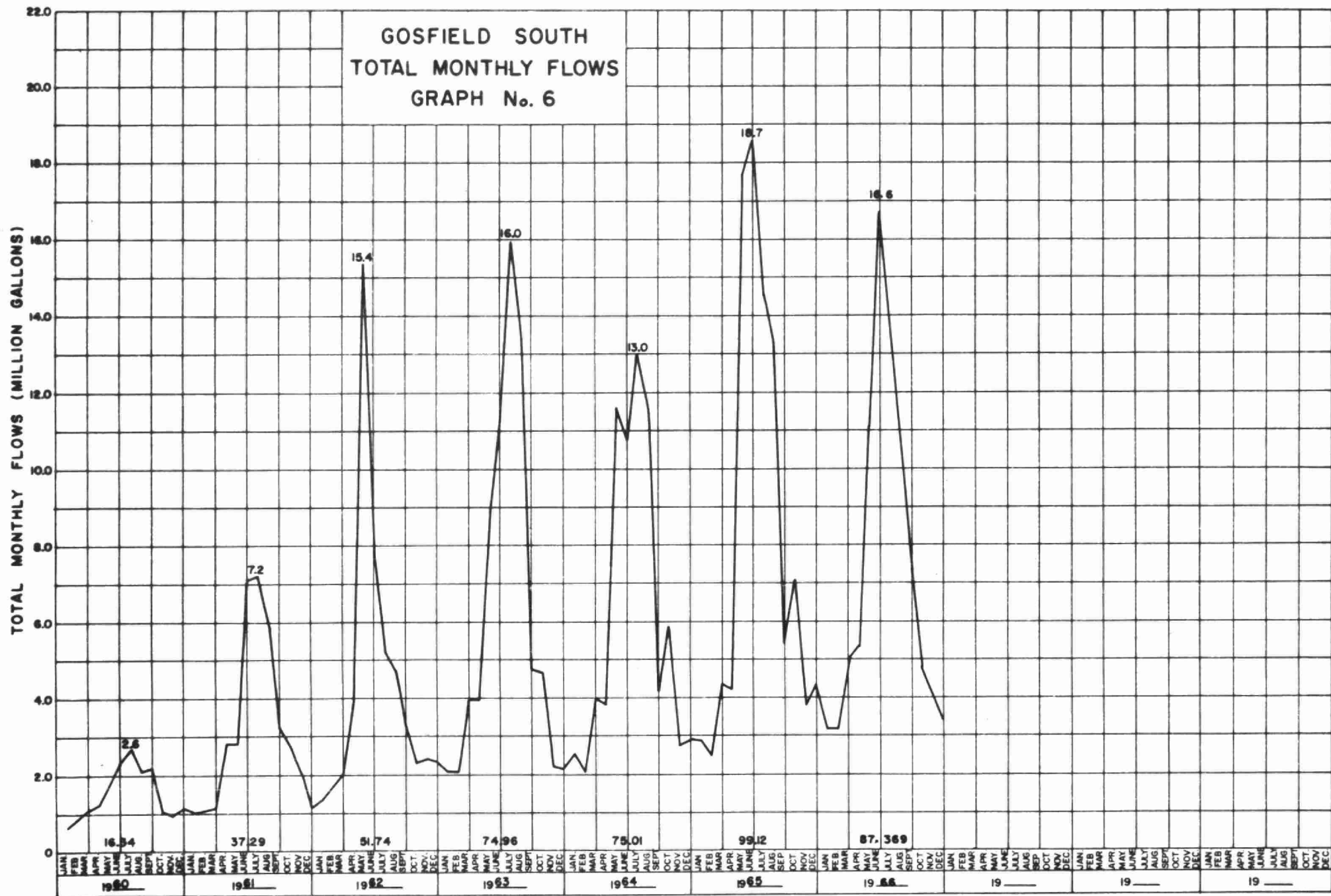


# ESSEX TOTAL MONTHLY FLOWS GRAPH No. 4

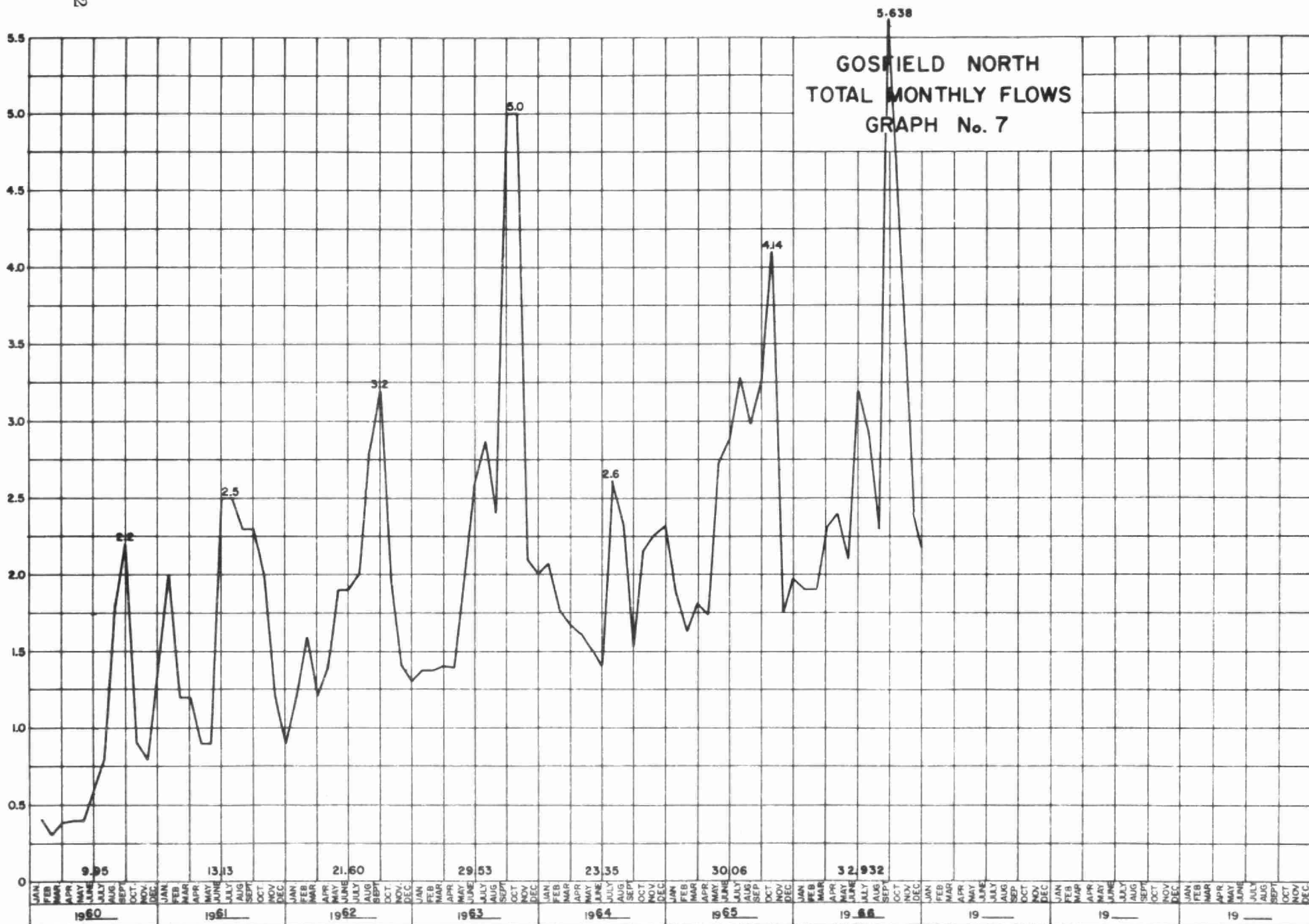
TOTAL MONTHLY FLOWS (MILLION GALLONS)





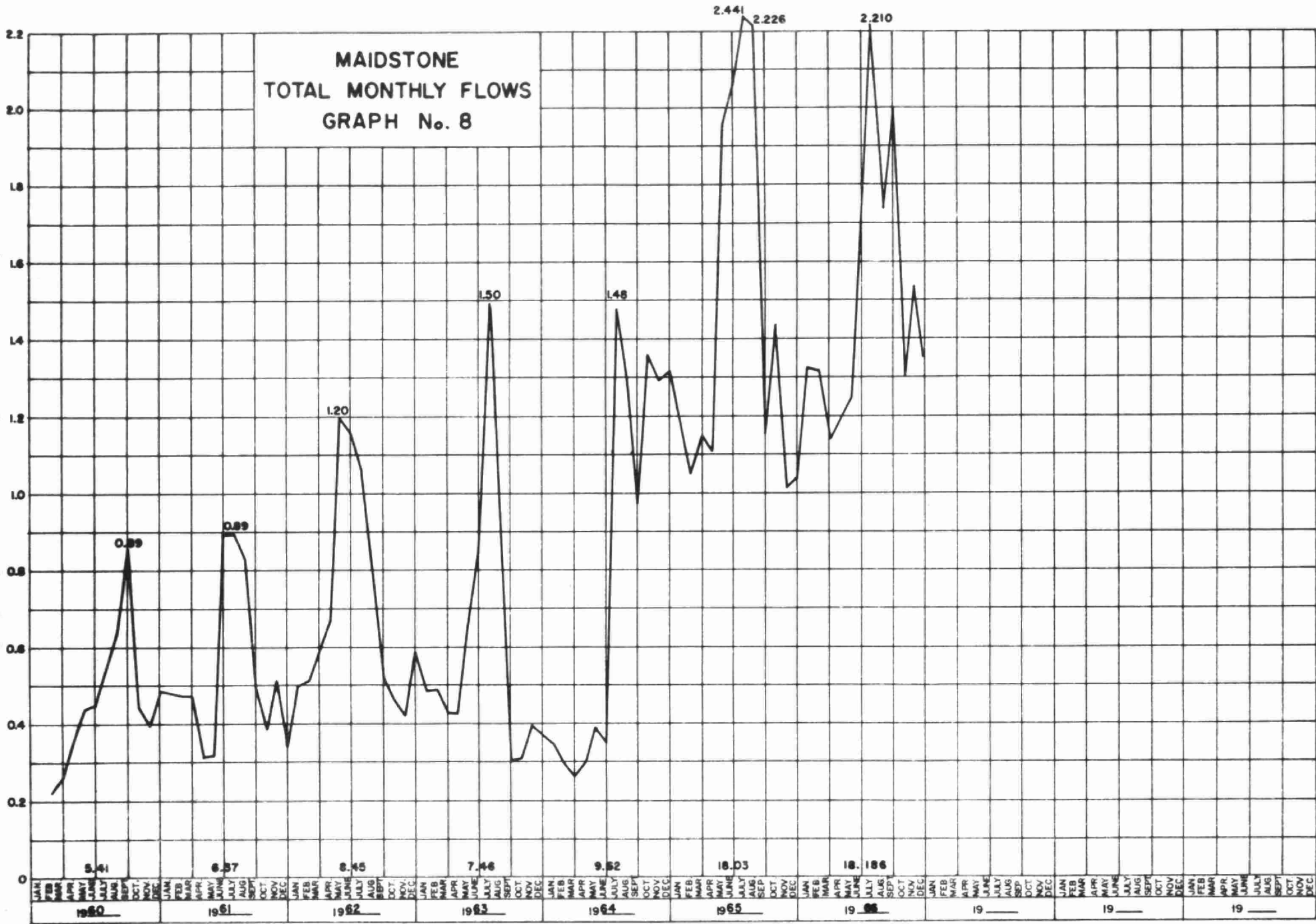


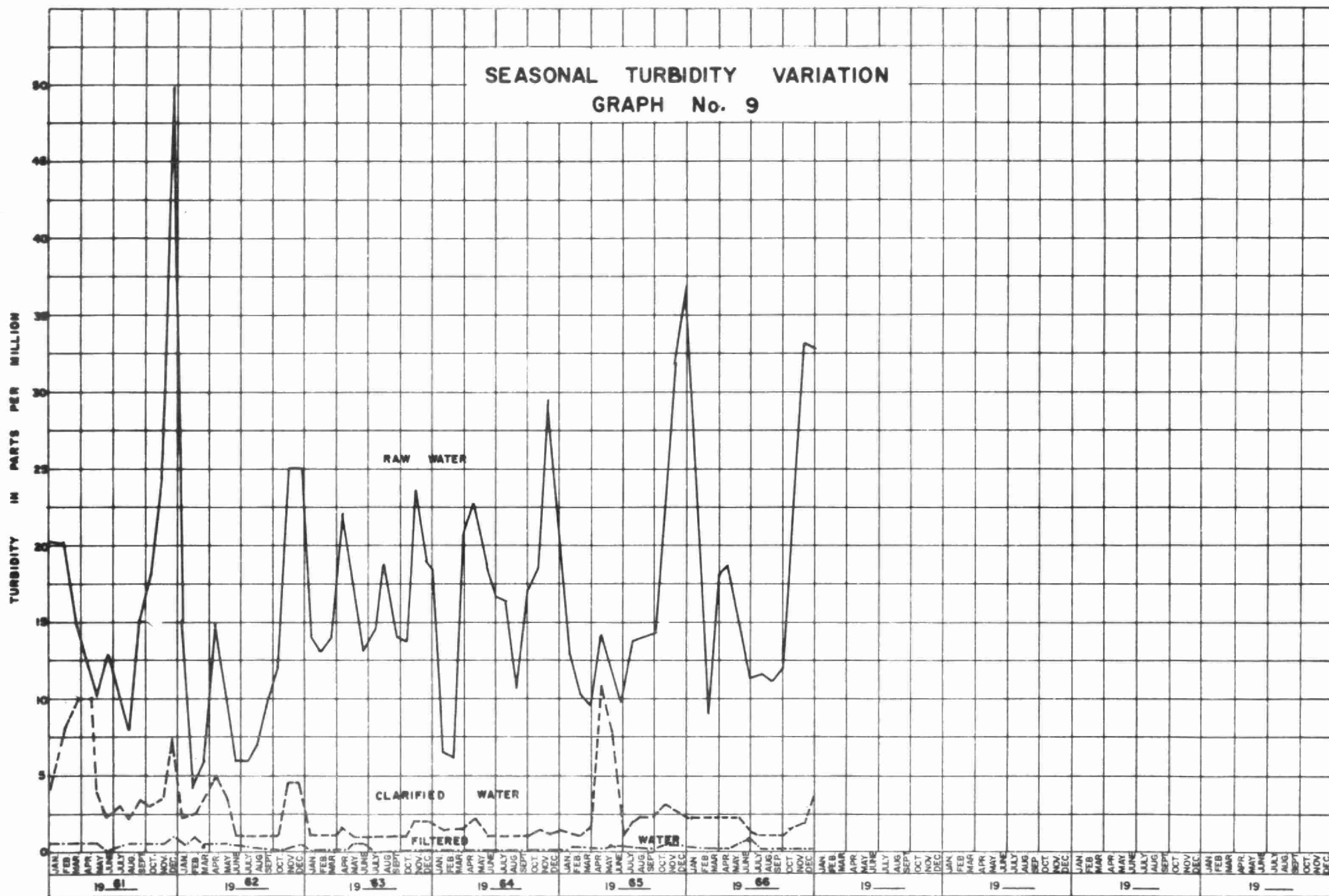




TOTAL MONTHLY FLOWS (MILLION GALLONS)

MAIDSTONE  
TOTAL MONTHLY FLOWS  
GRAPH No. 8

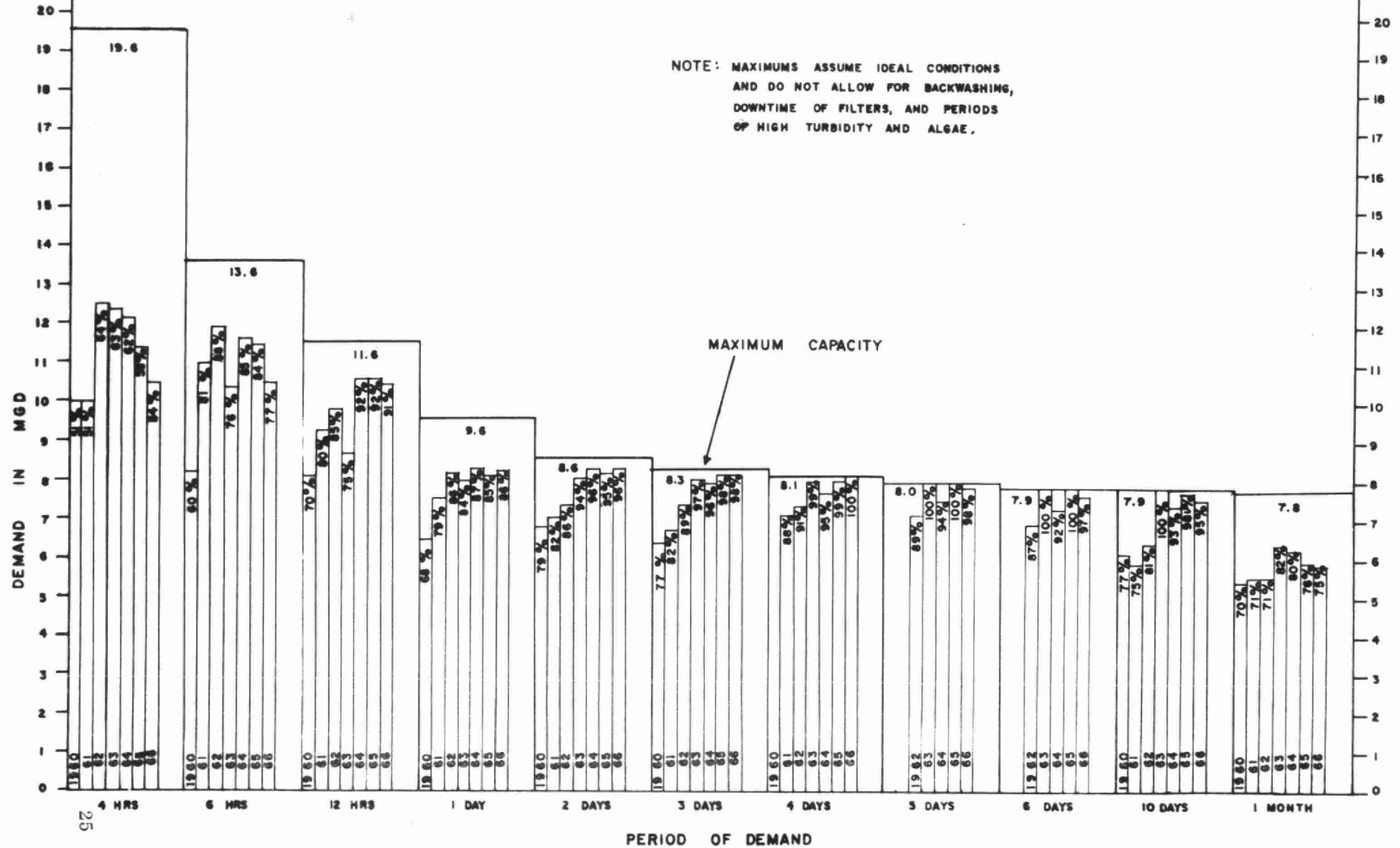




# PEAK DEMAND AS A PERCENTAGE OF DESIGN CAPACITY

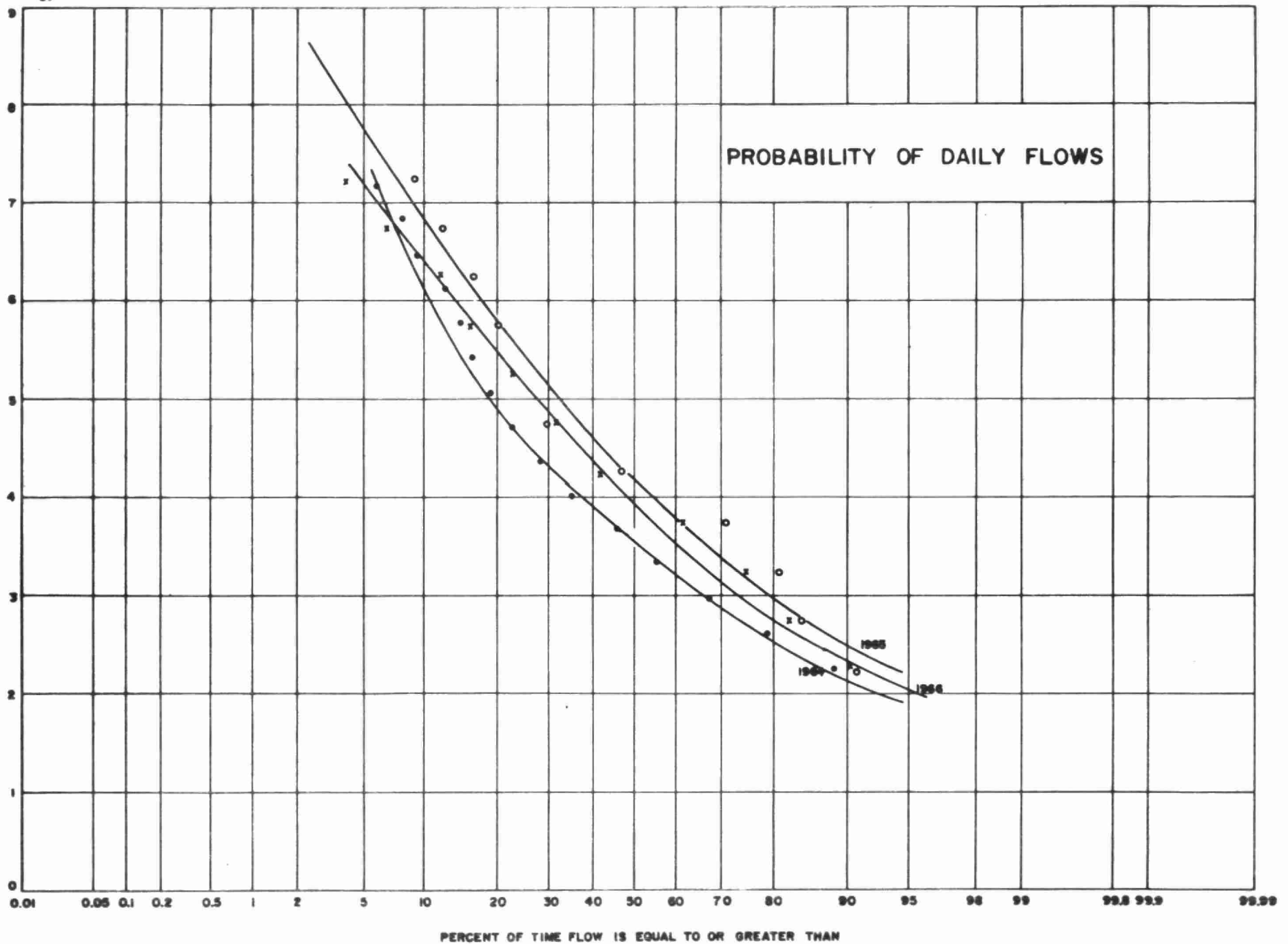
## GRAPH No. 10

NOTE: MAXIMUMS ASSUME IDEAL CONDITIONS  
AND DO NOT ALLOW FOR BACKWASHING,  
DOWNTIME OF FILTERS, AND PERIODS  
OF HIGH TURBIDITY AND ALGAE.



MILLION GALLONS PER DAY

## PROBABILITY OF DAILY FLOWS



PERCENT OF TIME FLOW IS EQUAL TO OR GREATER THAN

		PRE-CHLORINATION		POST-CHLORINATION	
Month	Treated Plant Flow (MG)	Pounds Chlorine	Dosage Rate (PPM)	Pounds Chlorine	Dosage Rate (PPM)
January	89.676	1280.50	1.43	433.50	0.48
February	88.600	1234.25	1.39	421.25	0.48
March	94.525	1494.25	1.58	490.75	0.52
April	94.600	1860.00	1.97	615.50	0.65
May	124.600	3025.75	2.43	896.25	0.72
June	171.662	4483.00	2.61	1496.25	0.87
July	180.698	5578.25	3.09	1864.75	1.03
August	157.329	4644.75	2.95	1530.25	0.97
September	147.050	4215.25	2.87	1394.25	0.95
October	109.755	2668.25	2.43	886.75	0.81
November	104.333	1844.25	1.77	600.75	0.58
December	90.252	1215.75	1.35	398.25	0.44
Total	1453.080	33544.25	-	11028.50	-
Average	121.090	2795.35	2.31	919.04	0.76

## COMMENTS

During 1966, an average dosage of 2.31 ppm of chlorine was used in prechlorination to maintain a residual of 0.15 ppm. An average dosage of 0.76 ppm of chlorine was used in post-chlorination to maintain a residual of 0.5 ppm in the treated water pumped to the distribution system. A total of 44,573 pounds of chlorine were used. This is an increase over consumption in 1965 even though total flow was decreased. This indicates a poorer quality raw water in 1966 as opposed to 1965.

**Date Due**




## **CONCLUSIONS**

During 1966, the maximum demand on the plant equalled or exceeded 95% of the capacity over periods from two to ten days. Total consumption decreased by 3.4% even though the peak month remained unchanged. Turbidities continued to be extreme during certain periods and chlorine dosage, required to meet a proper residual increased. This indicates a deterioration in raw water quality since 1965. The plant load factor decreased from 0.554 to 0.536. Total system operating cost increased by only \$328. Cost for production was 8.44 cents per 1000 gallons or 1.69 cents per ton.

## **RECOMMENDATIONS**

Continued effort should be made to provide increased plant output capacity during heavy load periods and a consolidated policy with respect to field irrigation should be established in connection with any increased capacity proposal.



